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(54) Title: AQUEOUS FLOOR POLISHING COMPOSITION

(57) Abstract: An aqueous floor polishing composition contains 5 to 100 parts as solid of a styrene-butadiene type copolymer emulsion based on 100 parts as solid of an acryl-styrene type resin emulsion. The novel aqueous floor polishing composition forms a coat excellent in gloss restoration by buffing.

DESCRIPTION

Aqueous Floor Polishing Composition

Technical Field

The present invention relates to an aqueous floor
5 polishing composition excellent in gloss restorability.
In particular, the present invention relates to an
aqueous floor polishing composition which is desirable
for the application to floor surface of wooden floor
material, floor material comprised of synthetic resin,
10 or stone floor made of concrete or marble, especially,
for dry maintenance which is carried out as daily
maintenance by using a combination of cleaning with an
automatic floor cleaning machine and buffing with a
high-speed polisher.

15 Background Art

Floor polishing agents have been used for the
floor surface of wooden floor material, chemical floor
material made of synthetic resin, or stone floor
material comprised of concrete or marble for the
20 purpose of keeping the beauties of the floor material
and protecting the floor surface. The floor polishing
agents generally include oil-type agents using
solvents, aqueous agents, emulsion-type agents and the
like. For example, Japanese Patent Publication Nos. Sho
25 47-14019 and Sho 47-15597 disclose floor polishing
compositions which use a polyvalent metal compound in a
polymer of an ethylenically unsaturated compound. The

coating film obtained by applying and drying this floor polishing composition is excellent in durability or travelling, and nowadays, this type of floor polishing composition is dominantly used.

5 A floor polishing agent containing an aqueous emulsion of polyurethane resin has been developed for the purpose of improving anti-slip properties. See, e.g., Japanese Patent Publication No. Sho 53-22548. In addition, Japanese Patent Application laid-Open No. Sho 10 61-148273 discloses that in order to improve heel-mark resistance or scuff resistance, the film durability can be enhanced by using a mixture of an aqueous resin with colloidal silica and butoxyethyl phosphate in combination. Furthermore, Japanese Patent Application 15 Laid-Open No. Sho 8-41382 discloses a method for improving film durability. However, in the aforementioned prior art, there is no disclosure of significantly improving gloss restorability by buffing, and hence, the development of new technique has been 20 desired in this field.

 The buffing operations in dry maintenance are carried out for restoring the floor surface by plastically deforming or cut-removing small damages on the coating surface caused by walking, etc. and 25 restoring gloss lowered by walking, etc.

 In general, the improvement in the gloss restorability by buffing with floor polish may be

achieved by adjusting a composition of resin in an acryl-styrene type emulsion which is a main component of a polishing agent, but heel-mark resistance, scuff resistance, etc. are deteriorated. Accordingly, it has
5 been very hard to obtain a floor polishing composition which is excellent in gloss restorability by buffing, and besides, excellent in heel mark resistance and scuff resistance.

Disclosure of Invention

10 The present invention is to provide a novel, aqueous floor polishing composition capable of forming a coat showing excellent gloss restoration by buffing while retaining general properties such as durability required for floor polishing agents.

15 The inventors found out, as a result of eager investigation and study, that the use of a butadiene type copolymer component in an aqueous floor polishing resin composition will readily afford the evenness of a coat after buffing by means of a high-speed polisher,
20 thereby improving the gloss restoration by buffing.

Thus, according to the present invention, there is provided an aqueous floor polishing composition characterized by containing 5 to 100 parts as solid of
25 a styrene-butadiene type copolymer emulsion based on 100 parts as solid of an acryl-styrene type resin emulsion.

The styrene-butadiene type copolymer emulsion

which can be used for the present invention is preferably that obtained by copolymerization of styrene and butadiene. Any type of thus obtained copolymer may be used regardless of molecular weight, molecular structure and preparation method. For the

5 copolymerization of styrene and butadiene aromatic and/or aliphatic monomers such as methyl methacrylate and the like may be incorporated at an arbitrary copolymerization ratio. Copolymerization with

10 unsaturated fatty acid such as acrylic acid and methacrylic acid or dispersion into water using emulsifiers may be conducted for water dispersibility or water solubility. Such butadiene type copolymer latex, including copolymers obtained by emulsion

15 copolymerization of butadiene and a variety of monomers, is widely used for compositions for paper coating or the like. A typical example of such latex is described in Japanese Patent Publication No. 54-

20 6575. The water base floor polishing agent of the present invention can be prepared by adding such butadiene type copolymer latex into acryl-styrene type resin emulsions. It can be also prepared by

polymerizing monomers containing butadiene in the presence of acryl-styrene type copolymerization

25 components or polymerizing monomers such as aliphatic unsaturated compounds and styrene in the presence of butadiene type copolymerization components. Concerning

the ratio of acryl-styrene type resin to styrene-butadiene type copolymer emulsion, the styrene-butadiene type copolymer emulsion is in the range of 5 to 100 parts, preferably in the range of 5 to 50 parts, with respect to 100 parts of acryl-styrene type resin. The butadiene in the styrene-butadiene type copolymer emulsion is preferably in the range of 25 to 70 % by weight, and the styrene in the styrene-butadiene type copolymer emulsion is preferably in the range of 0 to 75 % by weight, and more preferably in the range of 30 to 75 % by weight.

An example of the acryl-styrene type resin emulsion which can be preferably used in the present invention is the resin composition disclosed in Japanese Patent Publication No. 44-24409 or the like. The composition comprises a copolymer of alpha, beta-ethylenic unsaturated carbonic acids and ester derivatives thereof, especially acrylic acid or methacrylic acid and ester derivatives thereof, and aromatic monomers such as styrene. Specifically an ethylenic unsaturated compound is selected from the group consisting of styrene, methylstyrene, acrylic acid, methyl acrylate, ethyl acrylate, propyl acrylate, butyl acrylate, hexyl acrylate, 2-ethylhexyl acrylate, lauryl acrylate, methacrylic acid, methyl methacrylate, ethyl methacrylate, propyl methacrylate, butyl methacrylate, hexyl methacrylate, 2-ethylhexyl

methacrylate, vinyl acetate, acrylonitrile, itaconic acid, maleic acid and the like, thereby obtaining the polymer emulsion by a known emulsion polymerization method.

5 In the present invention, for the purpose of satisfying various characteristics required for the floor polishing agent, various additives can be contained in the aqueous floor polishing composition. Among the characteristics, an appropriate sliding
10 property can be obtained and its black heel mark resistance and durability are made excellent by adding a wax to the composition. As the wax, it is possible to use an aqueous solution of a natural wax or a synthetic wax dispersed therein which is generally used
15 for floor polishing. Specifically, the natural wax includes carnauba wax, paraffin wax and the like. The synthetic wax includes polyethylene, polypropylene and oxides thereof as well as waxes obtained by polymerizing unsaturated monomers such as ethylene, propylene and
20 the like or monomers selected from the group consisting of α - or β -ethylenically unsaturated carboxylic acid, alkyl esters thereof and the like. Though the wax content in the aqueous floor polishing composition of the present invention is optionally determined, 0 to 20
25 % by weight is preferable.

A crosslinking agent is added to the aqueous floor polishing composition of the present invention to

improve the durability of an obtained coating film.

The crosslinking used in the present invention includes polyvalent metal salts or polyvalent metal complexes by which a metal crosslinking can be formed.

5 Specifically, it is possible to use calcium, magnesium, zinc, barium, aluminum, zirconium, nickel, iron, cadmium, strontium, bismuth, beryllium, cobalt, lead, copper, titanium and antimony. In particular, calcium, magnesium, zinc and aluminum are preferable. The
10 ligand for forming the polyvalent metal complexes includes carbonate ion, acetate ion, oxalate ion, malate ion, hydroxyacetate ion, tartrate ion, acrylate ion, lactate ion, octate ion, formate ion, salicylate ion, benzoate ion, gluconate ion, glutamate ion, and
15 glycine, alanine, ammonia, morpholine, ethylenediamine, dimethylaminoethanol, diethanolamine, monoethanolamine, diethanolamine, triethanolamine, as well as inorganic acids, organic acids, amino acids, amines and the like which are similar thereto. In
20 particular, zinc ammonium carbonate, calcium ethylenediamine-ammonium carbonate, zinc ammonium acetate, zinc ammonium acrylate, zinc ammonium malate, zirconium ammonium malate, zinc ammonium aminoacetate, calcium ammonium alanine and the like are preferable.

25 In the aqueous floor polishing composition of the invention, by incorporating an alkali-soluble resin, it is possible to improve the leveling property,

peelability and glossiness. As the alkali-soluble resin, there can be included styrene-maleic acid copolymer resin, rosin-maleic acid copolymer resin, water-soluble acrylic resin, water-soluble polyester resin, water-soluble epoxy resin, or the like. The content of the alkali-soluble resin in the aqueous floor polish composition of the present invention can arbitrarily be determined.

In the aqueous floor polishing composition of the invention, by incorporating an aqueous polyurethane type resin, it is possible to improve the durability. As the aqueous polyurethane type resin, there can preferably be used one containing a carboxylic acid and/or carboxylate bonded to a chain of a polyurethane type resin. Such a resin can be obtained by, for example, when producing a polyurethane type resin, adding diol or the like having a carboxylic acid group to diol and di-isocyanate, neutralizing the carboxylic acid group as needed, and effecting polymerization. The introduction of a carboxylic acid group affords an aqueous polyurethane type resin having water-dispersibility or water-solubility. Further, adding an emulsifying agent can make the resin aqueous as needed.

The aqueous floor polishing composition of the invention may contain an plasticizer or film-forming assistant. As the plasticizer, there are included dibutyl phthalate, dioctyl phthalate, 2-pyrrolidone,

octyl diphenyl phosphate, tributoxyethyl phosphate, and the like. As the film-forming assistant, there are preferably used alkylene glycol monoalkyl ether, dialkylene glycol monoalkyl ether, trialkylene glycol monoalkyl ether, and there are specifically included diethylene glycol monobutyl ether, diethylene glycol monoethyl ether, dipropylene glycol monomethyl ether, and the like.

The aqueous floor polishing composition of the invention may contain silica sol. Further, the composition may contain a fluorine type surfactant or a preservative.

The present invention will be described below in great detail by giving Examples and Comparative Example which will illustrate the technical effects of the present composition.

EXAMPLE 1

Ten (10) parts of a styrene-butadiene type copolymer latex composed chiefly of styrene/butadiene = 60/40, having Tg of -1°C was added to 100 parts of an acryl-styrene type resin emulsion composed of butyl acrylate/methyl methacrylate/ styrene/methacrylic acid = 32/28/20/20, having Tg of 46°C and an acid value of 130 to prepare an aqueous floor polishing composition 1 of the present invention.

EXAMPLE 2

An aqueous floor polishing composition 2 of the

present invention was prepared in the same manner as in Example 1 except that the amount of the styrene-butadiene type copolymer latex was changed to 20 parts.

EXAMPLE 3

5 An aqueous floor polishing composition 3 of the present invention was prepared in the same manner as in Example 1 except that the amount of the styrene-butadiene type copolymer latex was changed to 30 parts.

COMPARATIVE EXAMPLE

10 Only the acryl-styrene type resin emulsion used in Example 1 was used and made an aqueous floor polishing composition 4.

15 The aqueous floor polishing composition obtained in Example 2 was dried at 60°C for 12 hours to prepare a sample for analysis, which was then analyzed as to the butadiene contained in the composition by using an infrared spectrophotometer (KBr tablet method; integration for 100 times using 60SX Fourier transform infrared spectrophotometer manufactured by Nicolet).

20 As a result, absorption peaks were observed in the wavelength regions of 960 to 970 cm^{-1} (trans 1,4 CH bending vibration), 900 to 920 cm^{-1} (R-CH=CH bending vibration) and 1640 cm^{-1} (C=C stretching vibration) which are the characteristic absorption bands of
25 butadiene copolymer. Further, as a result of another analysis which was carried out by using a thermal decomposition gas chromatograph (HP5890A gas

chromatograph manufactured by Hewlett Packard Co.,
Ltd.; FID detection; high frequency furnace type
thermally decomposing apparatus manufactured by Nippon
Bunseki Kogyo K.K.; thermal decomposition at 590°C for
5 sec.), the butadiene monomer decomposed was
confirmed, so that it was confirmed that butadiene was
contained as the monomer component in the aqueous floor
polishing composition of the present invention.

The aqueous floor polish compositions 1 - 4
prepared in Examples 1-3 and Comparative Example 1 were
used to prepare floor polishing agents. To 100 parts
by solid weight of the composition, 10 parts of
tributoxyethyl phosphate (a plasticizer), 25 parts of
diethylene glycol monoethyl ether (a filming aid), 0.05
parts of fluorine-based detergent Zonyl FSJ (25%
solid)(a product of Du pont), 6.37 parts of ammonium
carbonate zinc aqueous solution (12% solid), 6.25 parts
of styrene maleic acid resin SMA-2625A (15% solid)(a
product of ATOCHEM), 18.76 parts of polyethylene wax
emulsion Hytec E-4B (40% solid) (a product of Toho
Kagaku Inc.), and 0.68 parts of Deltop (a preservative,
a product of Takeda Chemical Industries) are added
successively.

With each aqueous floor polishing agent thus
obtained, gloss restoration by buffing was determined.
The results are shown in Table 1. The determination
method is as follows:

1. Glossiness: determined according to JIS K-3920 (Test method for floor polish);

2. Gloss restoration by buffing: Onto a homogeneous vinyl floor tile (a product of TORI Inc., product name:

5 MATICO S PLAIN No.5626), the sample polishing agent was

applied five times, and then the glossiness was

measured (a). After that, the gloss was removed by

using an automatic floor washing machine J-CRUISE (a

product of Johnson Professional Inc.)(b)), then the

10 tile was buffed twice by using Ultra high speed

polisher SPRINT-2000BP(a product of Johnson

Professional Inc.) with a green pad (c and d), to

determine the gloss restoration by buffing from the

glossiness difference before and after buffing.

15

Table 1
Glossiness Restoration by Buffing

	Examples			Comp.Example
	1	2	3	4
Glossiness				
(a) 5x application	73	72	70	75
(b) before buffing	51	50	52	52
(c) after first buffing	65	65	67	58
(d) after second buffing	67	69	70	60
Gloss restoration(%)				
after 1st buffing	64	68	83	26
before 2nd buffing	73	86	100	35

Gloss restoration(%)=(gloss after buffing - gloss before buffing)/(gloss after 5x application - gloss before buffing)

Effect of Invention

As shown in Table 1, high rates of gloss restoration are attained by using the composition of the invention. In other words, the use of an aqueous floor polishing composition containing 5 to 100 parts as solid of a styrene-butadiene type copolymer emulsion based on 100 parts as solid of an acryl-styrene type resin emulsion, according to the invention, will afford both high gloss

restorability in buffing and high durability that have been long desired as properties for floor polishing agents. The aqueous floor polishing composition of the invention is particularly suitable for 'dry
5 maintenance' that is a daily maintenance work comprised of washing by means of an automatic washer and buffing by means of a high-speed polisher.

CLAIMS

1. An aqueous floor polishing composition characterized by containing 5 to 100 parts as solid of a styrene-butadiene type copolymer emulsion based on 100 parts as solid of an acryl-styrene type resin emulsion.

AMENDED CLAIMS

[received by the International Bureau on 25 January 2000 (25.01.00);
original claim 1 amended; new claim 2 added (1 page)]

1. An aqueous floor polishing composition comprising 5 to 100 parts by weight of a solid styrene-butadiene type copolymer emulsion based on 100 parts solids of an acrylic-styrene type resin emulsion.

2. A method of imparting gloss to a flooring surface and maintaining said gloss comprising:

a) applying to a floor an aqueous floor polishing composition containing 5 to 100 parts by weight of a solid styrene-butadiene type copolymer emulsion based on 100 parts solids of an acrylic-styrene type resin emulsion;

b) allowing said composition to dry to form a glossy film on said floor; and

c) periodically washing said film with water and thereafter buffing said film with a high-speed polisher to restore said gloss.

AMENDED SHEET (ARTICLE 19)

Statement Under Article 19(1)

Claim 1 is amended to improve the English wording of the claim. New claim 2, a method claim, is added to obtain a wider protection of the present invention. Claim 2 is a method of imparting gloss to a flooring surface and maintaining the gloss by using the floor polishing composition defined in claim 1.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 99/03942

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C09G1/04 C09G1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	DE 42 43 471 A (HENKEL-ECOLAB) 23 June 1994 (1994-06-23) claims ----	1
A	EP 0 449 263 A (JAPAN SYNTHETIC RUBBER CO.) 2 October 1991 (1991-10-02) examples 5-8, 11; table 1 -----	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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